WHITE PAPER

ENTITLED

"LABELING OF BIOLOGICAL SPECIMENS"

(BASED ON PRESENTATIONS & DISCUSSIONS FROM THE JUNE 13, 2003 SAIC-FREDERICK LABEL WORKSHOP)

PREPARED ON NOVEMBER 30, 2003
JOINTLY BY:

SAIC-Frederick, Inc.
A Subsidiary of Science Applications International Corporation
An Employee-Owned Company

BRADY

ACKNOWLEDGEMENTS

MARK COSENTINO FROM SAIC-FREDERICK, INC. AND JULIE SCHOENBORN FROM BRADY CORPORATION, INC. WOULD LIKE TO RECOGNIZE THE FOLLOWING INDIVIDUALS AND THEIR AFFIATIONS FOR PARTICIPAING IN THE DISCUSSIONS AT THE WORKSHOP AND FOR THEIR INSIGHTFUL COMMENTS DURING THE PREPARATAION OF THIS DOCUMENT.

PRESENTED IN ALPHABETICAL ORDER

PHIL BAIRD – MCKESSON BIOSERVICES, INC.
SHAWN BROWN – SAIC-FREDERICK, INC.
CARLA CHORLEY – BBI BIOTECH RESEARCH LABORATORIES
KAREN DREW – BBI BIOTECH RESEARCH LABORATORIES

KATHLEEN GROOVER – MCKESSON BIOSERVICES, INC.
JAMES GROSS – BRADY CORPORATION, INC.
MIKE KADRICH – BRADY CORPORATION, INC.
JACKIE KING – BIORELIANCE CORPORATION

BILL KOPP – SAIC-FREDERICK, INC.
KEVIN MEAGHER – INFORMATION MANAGEMENT SERVICES
ERRANCE MEEKS – SAIC-FREDERICK, INC.
JULIE METCALF – NIAID/NIH

KAREN PETTIT – WESTAT CORPORATION
LIGIA PINTO – SAIC-FREDERICK, INC.
KAREN PITT – BIORELIANCE CORPORATION
ADAM RUPERT – NIAID/NIH

MANIMEKALAI SARAVANAN – CCR/NCI
KATHI SHEA – BBI BIOTECH RESEARCH LABORATORIES
RANDY STEVENS – SAIC-FREDERICK, INC.
CHRIS THOMAS – INFORMATION MANAGEMENT SERVICES

EARL WOOD – MCKESSON BIOSERVICES, INC.
JIM VAUGHT – DCEG/NCI

TABLE OF CONTENTS

ALL SECTION TITLES ARE HYPERLINKED TO THE PAGE WHERE THE INFORMATION IS PRESENTED

SECTION TITLE

I. Purpose: To provide necessary technical and product-related information to be able to standardize labels used on various types of biological specimens collected by the National Cancer Institute (NCI) and their collaborators for NCI-directed studies.

II. Scope: This White Paper presents information for optimized label configuration, supplies and equipment needed for the following four specimen storage vessels or devices at different temperatures commonly used by the NCI: 1.) Small vials that hold volumes <1.0 ml, 2.) Cryovials that hold volumes between 1.0 – 2.0 mls, 3.) Microscope slides and 4.) Paraffin tissue blocks.

III. Historical Overview: Necessity for a White Paper on NCI specimen labeling arose from the need to provide Investigators, Study Managers, and Repositories associated with NCI-directed studies a convenient, centralized location for label relevant information in an effort to standardize all specimen labels, with regard to size, eye read-able information, two-dimensional barcode encryption, supplies and equipment.

IV. Relevant Technical Information:

A. Labels – Labels recommended in this White Paper are of a type made up of five layers of material attached to a two-layer carrier (the paper-like surface a label is attached to when purchased) as depicted in Figure 1 below. Materials used for each layer of a label are specifically chosen to properly interact with each adjacent layer in order to achieve maximum performance specifications. Overall successful application and user satisfaction with label performance is related to the type of specimen being labeled and its corresponding storage temperature. The label (and its composite materials) must be chosen based upon its intended use and the conditions to which it will be exposed. Likewise, the label must be appropriately matched to a carrier so that the label is securely attached to the carrier, but can easily be released for application to a specimen container.

A brief overview of the function of each layer of label and carrier is provided as follows: 1.) The Topcoat is the outermost layer of the label that accepts the print. It can be smooth, rough, hard, or soft depending on the intended use. 2.) The First Primer is the layer of the label that contains the adhesive that holds the Topcoat to the Substrate. 3.) The Substrate is the layer of the label that consists of the material, which was selected to withstand environmental exposures that will be encountered during the life of the label. Typical types of Substrates that are used are: polyesters, vinyl, paper, polypropylenes and nylon. 4.) The Second Primer is the layer of the label unites the Substrate to the Adhesive. 5.) The Adhesive is the layer of the label that contains the adhesive, which attaches the label to the carrier until it is ultimately

applied to the specimen's storage container. 6.) The Release Coat is the first layer of the Carrier and it interacts with the label's Adhesive so that the label sticks to the Carrier but allows the label to easily be removed for its permanent application on the specimen or its container. 7.) The Liner is the second layer of the Carrier. It is composed of paper or polyester and covered with a Release Coat, which allows the label to adhere to the Liner after the label is manufactured so that the label can be delivered to the customer.

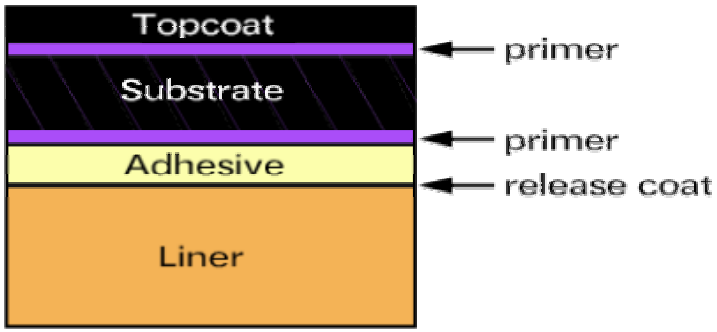


Figure 1: Construction of a Typical Label

B. Barcodes – Barcodes were invented in the early 1950s and have greatly facilitated the exchange of information. Two basic kinds of barcodes that are discussed in this White Paper, i.e., one-dimensional (linear) and two-dimensional. Each barcode, regardless of kind, is based on a particular symbology or rule that describes how a character, e.g., letter, number or punctuation, is defined and therefore presented for scanning. For example, a one-dimensional/linear barcode is comprised of a series of varying width and height vertical lines (bars) and spaces, which when scanned equate to a letter or symbol. Different combinations of the bars and spaces represent different characters that when decoded translates to a unique series of numerics or alpha and numerics, which are used to identify a particular specimen or vial, e.g., specimen ID. It is also important to have at least a ¼" of clear space (Quiet Zone) on each end of a one-dimensional barcode. This space defines the beginning and end of a barcode. Most retail stores use this type of barcode, which is limited to between 15-to-50 character capacities depending on the symbology that is used. Typically, barcodes include a check digit at the end of the encrypted information to validate that all of the preceding characters were decoded correctly. They also include an "interpretation line," i.e., encoded information printed in human readable characters printed directly below the barcode.

An example of a one-dimensional barcode with C128 symbology is presented in Figure 2 below. It is important to note that choosing to place one-dimensional barcodes on small vials may result in labels that are difficult or even impossible to scan (depending on the orientation of the label, i.e. vertical or horizontal to the axis of the container, respectively). Additionally it can result in ergonomic problems for staff required to inventory a large number of vials. For this reason a one-dimensional barcode is not the recommended barcode for NCI.

2S46044.001

Figure 2. Example of a One-Dimensional (Linear) Barcode using Code128 symbology

However, a two-dimensional barcode is recommended for NCI studies. It has a higher "data density" than any one-dimensional symbology and permits a smaller and more flexible barcode. In fact, it can encode 20 times the information in the same amount of space as compared to a one-dimensional barcode. This is especially important for small diameter vials used by NCI, e.g., robot tubes. A single two-dimensional barcode is able to encode up to 3,116 numeric or 2,335 alphanumeric characters. Basically, a two-dimensional barcode has improved scanning accuracy because it consists of four quadrants. Each quadrant can encrypt the same information to provide up to four-fold redundancy. The amount of redundancy in a barcode, typically termed Error Correction, is expressed as a percentage. This White Paper recommends that the label printer be set for a 200% Error Correction. Thus, if 50% of the barcode is damaged, a scanner will still be able to read the encrypted information on the label using the remaining half of the label. A two-dimensional barcode is also able to encode photographs, fingerprints, signatures, etc. and can be used in any language or combination of languages. An example of a two-dimensional barcode using Data Matrix symbology is presented in Figure 3 below. The focal nature of a two-dimensional barcode enables the staff to scan large collections of labeled vials or specimens with minimum ergonomic impact.

2S46044.001

Figure 3. Example of a Two-Dimensional Barcode using Data Matrix symbology

V. Label Materials and Formats for Specimen ID:

This section presents in table format, each of the four types of NCI commonly used specimen storage vessels or devices their corresponding recommended Brady Product information. The table includes: Brady B# (Product Number), Laboratory Application, Special Properties, Recommended Environments/Temperature and Surfaces Recommended. Linked to each Table is a Figure that contains an illustration and description of recommended label type and configuration associated with a particular application. The Label/Format Details include the Label Size Configurations, Recommended Printing Font, Data Matrix Size (used to size the bar code relative to the label size and the quantity of information that needs to be encrypted), Error Correction (the percent redundancy of encrypted information, 200% is the maximum amount [and suitable for NCI] which means that half of the label can be destroyed and it should still be decodable), and Quiet Zone (amount of clear space around a bar code needed to ensure a clean scan).

Also included at the end of each section are links for each type of specimen storage vessel or device in either: 1.) Brady's Codesoft format (NCI-suitable), 2.) An industry equivalent format or 3.) Laser printer format. These label formats can be accessed and downloaded directly from the Internet and copied for general use.

A. **Small Vials – <1.0 ml (PCR and microfuge tubes, robot tubes, and Eppendorf vials):** The materials below are suggested for smaller vials that need to house <1.0 ml of liquid, which typically are used in molecular applications or with various types of robotics. Each material will resist mechanical freezer (-80^{o}C) temperature and many will resist liquid nitrogen temperature (-196^{o}C) exposures, as well as warmer temperatures (80^{o}C to 121^{o}C) used during polymerase chain reaction (PCR)-formatted testing. To identify the best material for a particular application, review Table 1 below, which provides unique performance characteristics. Once the label material has been chosen, select the proper size and design of the label so that it fits the vial that is to be used for the study. Two different labeling configurations are presented below (Figure 4 and 5). The label in Figure 4 is a single application, which is applied around the body of the vial; whereas, the label in Figure 5, is designed as two parts. In the latter case, there is a rectangular label, which is applied to the body of the vial and a round label that can be adhered to the cap. This two-piece label can be used either together or separately. An advantage to the label pair configuration is the ability to identify a vial from two different vantage points, thus reducing the amount that a vial is handled. The disadvantage is that one can mix up the label parts during application, which can result in a vial that is labeled with two different identifiers.

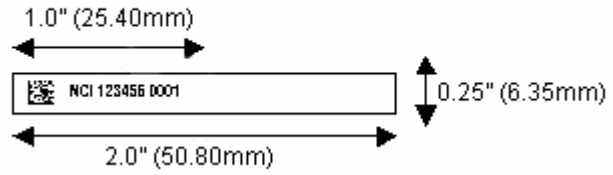
   Frequently, vials stored at extreme temperatures need to be labeled or relabeled. For these cases, included in Table 1, there is a product identified as B490 that with which one can directly label or relabel a specimen stored at temperatures ranging

from 121°C to –196°C (the best option). A second option is listed product, B427, which can also be applied to a frozen vial, but adheres by having the label tightly wrap onto itself rather than directly to the vial or specimen, i.e., it has a clear wrap-around adhesive tail which overlaps the printed label.

Table 1. A summary of various types of labels and their appropriate applications for <1.0 ml vials.

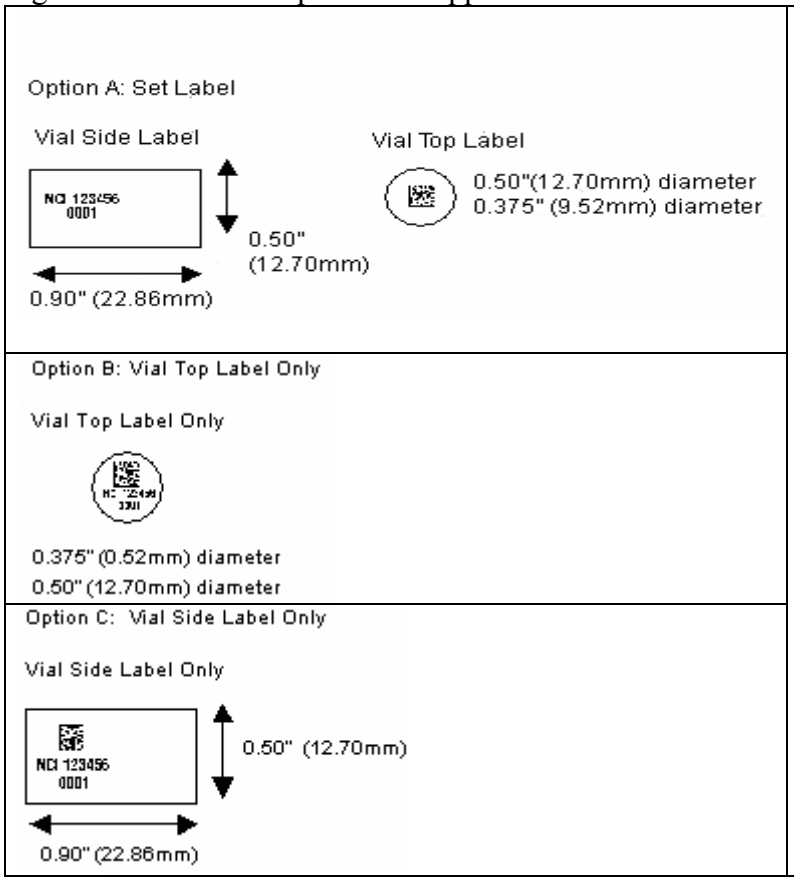
Brady B#	Laboratory Application	Special Properties	Recommended Environments/ Temperature	Surfaces Recommended
B499	Small vials, tubes, well plates, boxes, conical tubes and bottles.	Permanent adhesive, good contrast, conformable, write-on capabilities, and uses white nylon cloth.	Liquid nitrogen (liquid/vapor) and mechanical freezer storage, ice baths, and hot water bath temperatures. -196° C up to 90° C.	Glass, polypropylene, other plastics, and metal.
B427	Small vials, tubes, straws and conical tubes.	Permanent adhesive, self-laminating, write-on capabilities, and conformable.	Same as B499 but not autoclaveable.	A same surface as B499 but B427 is suitable for frozen samples if B427 is wrapped tightly onto itself.
B461	Small vials, tubes, straws, conical tubes and slides.	Permanent adhesive, self-laminating, conformable, low profile and excellent solvent resistance.	Liquid nitrogen (liquid/vapor) and mechanical freezer storage, ice and hot water bath temperatures and autoclave. –196° C up to 121° C.	Same surfaces as B499.
B490	Small vials, tubes, conical tubes and bottles.	Permanent adhesive, conformable, low profile, excellent solvent resistance, ability to adhere easily to frozen samples.	Same as B461.	Same surfaces as B499. **Easily adheres to frozen samples as long as the label slightly wraps 1/10 in. onto itself.**

Figure 4. A label option for <1.0 ml PCR, microfuge, and robot tubes.



Label /Format Detail	
Recommended Label Size /Part Number:	0.25" x 2.0", Brady Part Number Y303348 (B461 Custom Label), Brady Part Number Y368053 (B427 Custom Label)
Material:	**B461 Preferred, B427 Accepted**
Ribbon:	Brady R4300
Recommended Font:	Triumvirate Condensed Preferred, Minimum 6 Point Font
Data Matrix Size:	8.3 Minimum Narrow Bar
Error Correction:	Level 200
Quiet Zone:	1 Cell or Greater

Figure 5. Three label options for Eppendorf tubes.



Label /Format Detail

Recommended Label Size/Part Numbers:	Option A - 0.90" x 0.50" (vial side label) with 0.50" x 0.50" (top of vial label), Part Number THT-126-499-3
	Option A - 0.90" x 0.50" (vial side label) with 0.375" x 0,375" (top of vial label), Brady Part Number Y368052 (B499 Custom Size Label Set)
	Option B - 0.50" x 0.50" or (top of vial labels), Part Number THT-144-499-3 Option B - 0.375" x 0.375" (top of vial labels), Part Number THT-143-499-3
	Option C - 0.90" x .50" – vial side only label – Part Number THT-125-499-3
Material:	B499 Preferred
Ribbon:	Brady R4300
Recommended Font:	Triumvirate Condensed Preferred, Minimum 6 Point Font (note that option B format uses 5 pt. font)
Data Matrix Size:	8.3 Minimum Narrow Bar
Error Correction:	Level 200
Quiet Zone:	1 Cell or Greater

To download completed Codesoft NCI Suggested formats and instructions click here:

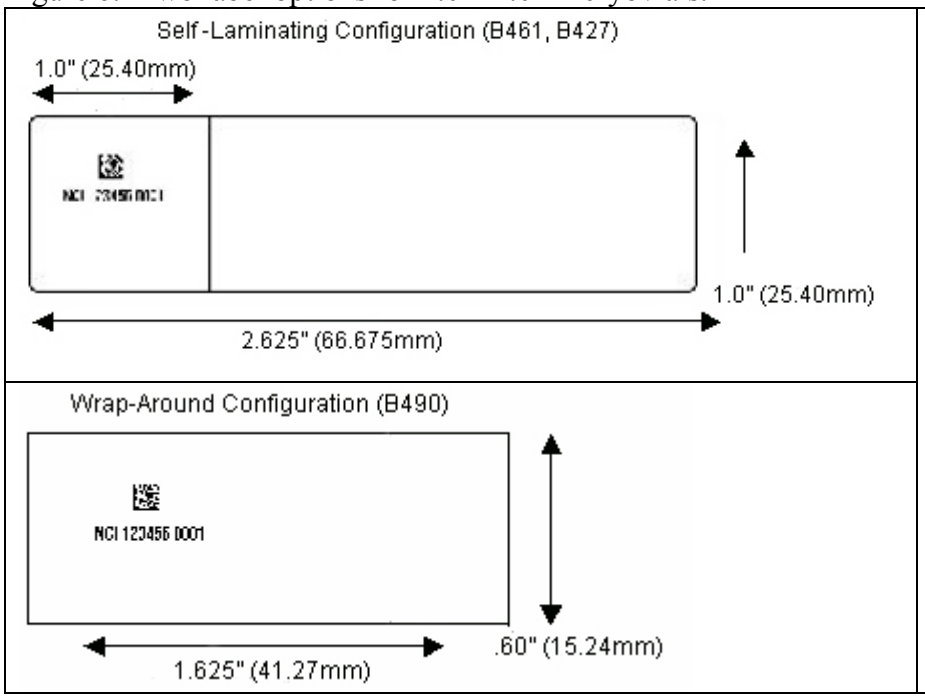
To download Brady TLS 2200/TLS PC link, desktop and laser laboratory label information click here:

B. **Standard Vials - 1.0 – 2.0 ml (Cryovial)**: The materials below are suggested for use on a standard size cryovial that can house ≥1.0 ml but ≤2.0 mls of fluid. Each listed material will withstand exposure to mechanical freezer (-80°C) and liquid nitrogen (-196°C) freezer temperatures. Typically, this size cryovial is used to store serum, plasma or cryopreserved peripheral blood mononuclear cells. This is probably the most widely used vial size, especially for long-term specimen storage. Review the unique performance characteristics in Table 2 below in order to choose the best material for both storage and testing applications for this container type. Due to the similarities in vial usage, the same type of labels is recommended for the Standard Vial as for the Small Vial, with one exception. Product B499 is not appropriate for the larger vial. Once the label material has been chosen, then select the proper size and design of the label to fit the vial that is to be used in the study. Figure 6 contains an Illustration and Label/Format Detail for two different label options, e.g., Self-Laminating and Wrap-Around Configurations. The main difference between the two options occurs when a frozen vial needs to be relabeled. The Self Laminating Configuration label (B427 and B461) uses a clear adhesive tail that wraps over the entire label and adheres to itself rather than directly to the frozen vial. Whereas, the Wrap-Around Configuration (B490) adheres directly to a frozen vial as long as the label slightly wraps onto itself by 1/10".

Table 2. A summary of various types of labels and their appropriate applications for 1.0 – 2.0 ml vials.

Brady B#	Laboratory Application	Special Properties	Recommended Environments/ Temperature	Surfaces Recommended
B427	Small vials, tubes, straws and conical tubes.	Permanent adhesive, self-laminating, write-on capabilities, and conformable.	Liquid nitrogen (liquid/vapor) and mechanical freezer storage, and ice and hot water bath temperatures. -196° C up to 80° C.	Glass, polypropylene, other plastics, metal, suitable for frozen samples if label is wrapped tightly onto itself.
B461	Same as B427 plus slides.	Permanent adhesive, self-laminating, conformable, low profile and excellent solvent resistance.	Liquid nitrogen (liquid/vapor) and mechanical freezer storage, ice and hot water bath temperatures and autoclave. –196° C up to 121° C.	Glass, polypropylene, other plastics, and metal.
B490	Same as B427 plus bottles but not suitable for straws.	Permanent adhesive, conformable, low profile, excellent solvent resistance, ability to adhere easily to frozen samples.	Liquid nitrogen (liquid/vapor) and mechanical freezer storage, ice and hot water bath temperatures and autoclave. –196° C up to 121° C.	Glass, polypropylene, other plastics and metal. **Easily adheres to frozen samples as long as the label slightly wraps 1/10 in. onto itself.**

Figure 6. Two label options for 1.0 – 2.0 ml cryovials.



Label/Format Detail

Recommended Label Size/Part Numbers:	1.0" x 2.625 "(Self-Laminating Configuration) Brady Part Number THT-131-427-3 (Figure 6a), THT-131-461-3 (Figure 6a) or THT-155-490-3 (Figure 6b)
Material (s):	B427, B461 or B490 Accepted
Ribbon:	Brady R4300
Recommended Font:	Triumvirate Condensed Preferred, Minimum 6 Point Font
Data Matrix Size:	8.3 Minimum Narrow Bar
Error Correction:	Level 200
Quiet Zone:	1 Cell or Greater

To download completed Codesoft NCI Suggested formats and instructions click here:

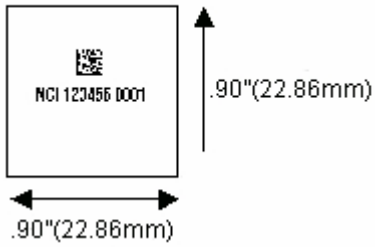
To download Brady TLS 2200/TLS PC link, desktop and laser laboratory label information click here:

C. **Microscope Slides**: The material described below is suggested for labeling a microscope slide because it is best suited for a wide range of processing and testing applications. Review the unique performance characteristics given in Table 3 below especially they relate to solvent resistance required during staining and destaining. Once the label material has been chosen and is acceptable for processing at various temperatures needed, then select the proper size and design of the label to fit the microscope slide that is to be used. Please see Figure 7 for layout of label format, material and size information.

Table 3. A summary of label type and its appropriate application for microscope slides.

Brady B#	Laboratory Application	Special Properties	Recommended Environments/Temperature	Surfaces Recommended
B488	Slides, plates, bottles, and conical tubes.	Permanent adhesive, good contrast, ideal for flat surfaces, write-on capabilities, smooth topcoat, excellent solvent resistance, and white polyester.	Liquid nitrogen (liquid/vapor) and mechanical freezer storage, ice baths, and autoclave temperatures. -196° C to 100° C	Glass, polypropylene, other plastics, and metal.

Figure 7. The recommended label option for microscope slides.



Label /Format Detail

Label Size:	.90" x .90". Brady Part Number THT-141-488-3
Material:	B488 Preferred
Ribbon:	Brady R4300
Recommended Font:	Triumvirate Condensed Preferred, Minimum 6 Point Font
Data Matrix Size:	8.3 Minimum Narrow Bar
Error Correction:	Level 200
Quiet Zone:	1 Cell or Greater

To download completed Codesoft NCI Suggested formats and instructions click here:

To download Brady TLS 2200/TLS PC link, desktop and laser laboratory label information click here:

D. **Paraffin-Embedded Tissue Blocks**: The material below is recommended for the labeling of a tissue block after it has been embedded in paraffin. Please review the information presented in Table 4 below for unique performance characteristics of the material, especially as they are related to temperature since paraffin blocks tend to be stored at –80°C and can also be subjected to a heat block for needed sample processing. Please see Figure 8 for pertinent layout of Label/Format Detail.

Table 4. A summary of label type and its appropriate application for paraffin tissue blocks.

Brady B#	Laboratory Application	Special Properties	Recommended Environments/ Temperature	Surfaces Recommended
B498	Slides, bottles, plates, boxes, conical tubes, and tissue cassettes/paraffin blocks.	Removable from flat surfaces, good contrast, smooth topcoat, write-on capabilities, and white vinyl cloth.	Mechanical freezer storage and heat block treatment. -70° C to 80° C	Glass, polypropylene, other plastics, and metal.

Figure 8. The recommended label option for paraffin-embedded tissue blocks.

Label/Format Detail

Label Size:	.984" x .192", Brady Part Number Y366419 (B498 Custom Label)
Material:	B498 Preferred
Ribbon:	Brady R4300
Recommended Font:	Triumvirate Condensed Preferred, Minimum 6 Point Font
Data Matrix Size:	8.3 Minimum Narrow Bar
Error Correction:	Level 200
Quiet Zone:	1 Cell or Greater

To download completed Codesoft NCI Suggested formats and instructions click here:

For laboratory labeling applications or product not listed on this document, please see our Brady Laboratory Products Website

www.bradylabid.com

VI. Suggested Printing Hardware

For each labeling project, there are several printing-related questions that need to be answered before a plan can be formulated to print the appropriate type, format(s) and quantity of needed labels. A few basic questions must be answered before beginning. Should printing of labels be out sourced to a commercial printing expert or done in-house? What are the associated costs for each, e.g., labor, materials/supplies and equipment? If labels are printed in-house, should the printing be centralized (repository or data-coordinating centers) or performed at multiple locations (study sites)? What type of Quality Assurance/Quality Control needs to be instituted for each situation, to ensure that so duplicated specimen identifiers are not used and/or poor quality labels are not generated?

In-house printing generally takes place at or near the point of use. The data encoded are usually variable, entered by an operator through a keyboard or downloaded from the host computer. The most common bar code print technologies for in-house use are:

- Dot Matrix — A moving print head, with one or more vertical rows of hammers, produces images by multiple passes over a ribbon. These passes create rows of overlapping dots on the substrate to form an image. Serial dot matrix printers produce images character by character; high-volume dot matrix line printers print an entire line in one pass. The advantage to this type of print is that it is inexpensive but the print tends to be of poor quality with very little flexibility. *Not Recommended*

- Ink Jet — This technology uses a fixed print head with a number of small orifices that project tiny droplets of ink onto a substrate to form an image made up of overlapping dots. Ink jet printers are used for in-line direct marking on products or containers. This type of print results in a label with poor contrast and durability. The print is not resistant to solvents and can smear if the ink does not dry completely. *Not Recommended*

- Laser (Xerographic) — The image is formed on an electrostatically charged, photoconductive drum using a controlled laser beam. The charged areas attract toner particles that are transferred and fused onto the substrate. The advantages of this type of printer are its wide equipment availability and excellent print quality. However, it has limited print permanence and generates a high number of waste labels since it cannot print a single label. It is not well suited for the wide range of temperatures to which biological samples are subjected. *Not Recommended*

- Direct Thermal — Heating elements in the print head are selectively heated to form an image made from overlapping dots on a heat-sensitive substrate. This type of printing is normally seen with paper applications and does not require a ribbon but causes increased wear on the print head resulting in its replacement. The limitations of this type of printing are limited substrate choice, questionable cleanliness of materials, and short life expectancy of the printed label. *Not Recommended*

- Thermal Transfer — Thermal Transfer technology uses much of the same type of print head as Direct Thermal, except that an intervening ribbon with resin-based or wax-based ink is heated and transfers the image from the ribbon to the substrate. Thermal Transfer produces the most stable image for a variety of environments and allows for variation in substrate and ribbon formulations to meet the needs of different applications. It offers crisp resolution with 200 – 600 dots per inch, high speed, excellent print quality and the highest read-rate in bar coding. Waste material is controllable. There is a higher cost associated with Thermal Transfer printing as a result of the need to match ribbon and substrate requirements and compatibility. Additional operator training is required with this type of printing. Preventative maintenance is critical to ensure print quality. ***Overall, Thermal Transfer is the method recommended by this White Paper.***

Another issue that is often overlooked, in both outsourcing and in-house printing, is waste. Waste may occur through obsolescence of the data on the labels, degradation during storage (for a variety of reasons), application problems and other factors. Some figures suggest that as much as 10% should be added to the cost of printed labels for waste or obsolescence due to improvements in labeling technology. This figure may be either high or low depending on quantities, training of personnel, or the need to frequently rethread the printer when label stocks are changed. To avoid the latter problem and decrease waste, it is recommended that dedicated printers be used for each specific label design and label stock.

Suggested on-site printers for specimen container labeling are presented below, which is based on the number of labels needed in a single day, e.g., low, medium and high volumes. Associated web links are given to provide relevant product information. Note all recommendations are for Thermal Transfer Printers. The model and style of printer is related to the quantity of labels needed. At the bottom of this section is some valuable preventative maintenance information.

A. Low Volume Requirements – up to 500 labels/day

1. TLS PC Link Portable Thermal Transfer Printer

   a. TLS PC Link Operational Tips

b. TLS PC Link Manual

c. TLS PC Link Programmers Guide

B. Medium Volume Requirements

1. BP-THT-1344 Thermal Transfer Printer - up to 1000 labels/day

a. BP-THT-1344 Operators Manual

2. BP-THT-300 MVP Printer – up to 1500 labels/day

a. BP-THT-300 MVP Operators Manual

C. High Volume Requirements – over 1500 labels/day

1. BP-THT-600X-Plus Thermal Transfer Printer

a. BP-THT X-Plus Series Thermal Transfer Printer Operators Manual

2. BP-6441 Thermal Transfer Printer

a. Red Series Thermal Transfer Printer Manual

D. Preventative Maintenance for Benchtop Thermal Transfer Printers

VII. Data Collection Hardware and Suggested Software

A. **Data Collection Hardware:** Below are suggested types of handheld imagers for scanning two-dimensional and/or one-dimensional or only one-dimensional barcodes. This hardware information is based on input from various contractors and is linked to their website for additional product information.

1. Suggested Handheld Scanners (2D & Linear Barcodes)
   a. Please see the above site for manuals, part numbers, configurations, specification sheets etc.
2. Background information
   a. Scanner and Barcoding Technology – Aim Global
   b. Data Matrix Structure and Advantages

c. "Online" classroom training on Barcoding Related Topics – website that has on-line training courses about barcodes and their uses. The information is good for the novice and the experienced barcode user.
d. 2D Imager presentation
e. Whitepaper on Error Correction Levels using Data Matrix
f. Whitepapers on Bluetooth Technology - "Bluetooth" is the code name for a technology specification for small form factor, low-cost, short-range radio/wireless links between portable or desktop devices that allows for the transfer of information. The initiative for the standard belongs to the Bluetooth SIG (Bluetooth Special Interest Group). This website presents information on how to use this technology.

B. **Suggested Software:** Also provided in this section is an example of how Brady's software packages (listed below) can integrate with various Laboratory Information Management Systems (LIMS) to offer convenience in printing labels.

Envision the power of having a single integrated database system common throughout a large clinical trial that has the capability to develop, track, and print labels. Imagine having the ability to globally share clinical trial samples without the potential for duplicate sample numbers. Think of the time that can be saved by using a bar-coded label packed with all the pertinent information that eliminates the need for re-labeling, and provides a vial that can be seen because there aren't multiple labels stuck on it. These concepts are exactly what prompted BBI Biotech Research Laboratories (BBI Biotech, a government contractor who processes and stores NCI samples), Information Management Services (IMS, a government contractor who designed and maintains the Biological Specimen Inventory System version II [BSI-II] for NCI) and Brady Corporation (Brady) to collaborate. If you want to learn more about how these three companies integrated label printing with their LIMS, please contact them directly (www.bbii.com, www.imsweb.com, and www.bradylabid.com).

Many repositories and laboratories use BSI-II, not only to track samples from an inventory perspective, but also because BSI-II has a label/sample identification reserve. BSI-II has the capability to reserve blocks of printed numbers, so a duplicate number cannot be issued. This capability is critical, because when dealing with 50 or 100 studies that all need to develop labels at multiple locations, control of the process must be established. By providing a system that interfaces with labeling software and hardware, the user can design formats that utilize a variety of label materials for different applications and even harsh environments.

For this effort, Brady's CODESOFT™ Label Design Software was chosen because it includes such features as printing text, bar codes, two-dimensional bar codes and ODBC data importing. Another important feature is that CODESOFT™ can be integrated with a Laboratory Information Management System (LIMS) to print labels on demand. With three levels to choose from, CODESOFT ™ can be the foundation of any tracking solution.

In addition, Brady's SENTINEL™ Print Pack can be used as the distributive printing middleware to capture the needed data and to automate the printing of labels created with CODESOFT™ label design software. This approach can be used on any ERP, MRP II, or WMS system. SENTINEL™ Print Pack allows the user to send data from the host application into CODESOFT label designs without leaving the host system. This is done by connecting the data from an application to the CODESOFT printing functions through an ActiveX protocol between the two modules. SENTINEL™ Print Pack's multithreaded architecture allows labels to be printed simultaneously throughout a facility to over 500 different thermal printers, any Windows®- or Macintosh-supported printer. Multiple applications can send transactions to the print server without compromising performance.

This information is presented to demonstrate how label making can be integrated into an inventory tracking system or a LIMS. A similar configuration may be possible for your operations.

Below are Internet links to the specific label-relevant software.

1. Barcode/Labeling Software
    a. Codesoft™ Premiere or Enterprise
        i. Used for label formats that **contain linear barcodes or 2D codes**.
        ii. Competitive Comparison Sheet on Label Design and Printing Software Packages
        iii. Codesoft Comparison Features Matrix
        iv. Codesoft Operators Manuals, Quickstart Guides, Tutorials
        v. Codesoft Programmers Guide

    b. LabelMark™

i. Used for simple applications that contain **text-only or linear barcodes**.

ii. LabelMark tutorial

2. Integration Software Packages

a. Sentinel™

a. Sentinel Overview

b. Sentinel Users Manual

If the products that are discussed in this White Paper are not used, an industry equivalent needs to be obtained for a comparable performance.

For more information on labels, hardware or software included in this whitepaper, please contact Brady customer service by phone at 1-800-897-5876 or, click on Brady Lab Solutions Center.